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LOCAL BENEFITS FROM TIMBER INDUSTRY EXPANSION

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Every step in the wood-products manufacturing process adds to the value of the product and hence to the profit that can be derived from it. Obviously then, the more of these processes--from stump to salesroom--that can be carried on in one community, the more the economy of that community will benefit. A community that specializes only in timber growing and ships primary products "outside" for manufacture loses much of the potential earning power of the raw wood.

All this is common knowledge of course. But what has not been common knowledge is how much each step or process in wood-products manufacture increases the profit. A recent analysis of the operating records of 50 successful forest-product manufacturers in eastern Kentucky gives the first real insight into cost-and-return comparisons among the various production stages and processes in the industry.

Data Collection

Top management personnel of firms engaged in the preliminary manufacture and marketing of forest products were interviewed in 1958 regarding their 1957 operations so as to gain insight into their purchase policies, business methods, and sales policies. Information generalized from these interviews plus company records form the basis for this paper.

^{1/} The author is indebted to the Kentucky Division of Forestry for its help in collecting a part of the data and their encouragement in this project.

Analysis

All the companies contacted did not keep the same kind of records, of course. Consequently the collected data were combined and condensed into a standardized form so that they could be compared on an equal and objective basis. Data for individual firms doing the same kind of business were reduced to actual values per thousand board feet and combined for firms doing the same kind of business to illustrate the financial characteristics of that type of business.

Average costs and returns associated with each stage of production as determined in this study are shown in the tables. In addition, a range of costs for the concerns engaged in the particular type of business is given as a percent of the average selling price. In order to illustrate the effect of each additional operation in practical terms, data are presented for a hypothetical concern handling 2 million board feet a year. Such a plant size is common throughout the area.

Several case histories of each different type of plant, exemplifying six different stages of production, were considered. Although each of the plants studied has one specialty, most of them manufacture several different products. A pallet plant, for example, may produce grade lumber, crating parts, cooperage heading, etc., as well as pallets. So the concern's profit depends upon the net income from all products, not just that from pallets. The values and costs shown for the various types of operations then reflect combined production of all items.

The economic advantage to the plant operator in carrying the manufacturing further is shown in the first figure in each table (tables 2-7), i.e. the receipts per thousand board feet. It will be seen that there is a progressive increase as each step is added to the manufacturing process.

Stumpage & Log Costs

Because stumpage sellers and logging contractors were not contacted, the cost of stumpage and the cost of delivered logs were derived from other data. For those companies who bought stumpage only, average stumpage costs were obtained by dividing the total outlay for stumpage purchases by their production for the year after accounting for inventory changes. The average cost amounted to \$17.60 per thousand board feet lumber tally and ranged from \$15.72 to \$21.00 (table 1). However, such a figure ignores timber quality and location and species composition as well as competition for stumpage. Variation due to these causes can amount to 300 to 400 percent.

The cost for logging has been calculated by comparing operating costs for sawmills that both log and mill with costs for sawmills that mill lumber only. The differences were considered to be the costs of logging. Log values were based on then current quotations.

Table 1.--Breakdown of stumpage cost^{1/}

	: Average cost per thousand board feet :	
	<u>Dollars</u>	<u>Percent</u>
Stumpage	17.60	44.0
Wages and salaries	10.85	27.1
Equipment	2.67	6.7
Power	2.69	6.7
Other expenses	2.54	6.4
Unaccounted for margin	3.65	9.1
Total cost	<u>40.00</u>	<u>100.0</u>

^{1/} Based on quotation values - average log values were found to vary from \$30 to \$50 per thousand board feet. The value of \$40 per thousand board feet was chosen arbitrarily.

Manufacture of Green Lumber

Companies that sell green lumber and manufacture 1 to 1 1/2 million board feet a year kept adequate records and these form the basis for the values that follow. Green lumber is usually sold locally to concentration yards, other manufacturing concerns, and directly to consumers. The lumber inventory turnover rate was high, ranging from 12 to 20 times a year. And, often these operations were only carried on for from 30 to 40 weeks a year. The value per thousand board feet of their product averaged \$61.94 and the average among firms varied from \$57 to \$69 (table 2).

Few mills producing as much as 2 million board feet a year sell only green lumber. The costs and values common to small-mill operation though, are of use in subsequent comparisons. The value of plant and equipment for such a mill could be expected to amount to between \$30,000 and \$40,000. Inventories represent a negligible investment. Such a plant would provide full-time employment for between 12 and 20 men, both in the woods and the mill.

Table 2.--Producing rough green lumber
(Receipts and expenditures)

	Value per		Value per	
	thousand board feet		2 million	
	Average	Range	board feet	
	Dollars	Percent	Percent	Dollars
<u>Receipts</u>				
Green lumber sales	61.94	100		123,900
<u>Expenditures</u>				
Stumpage purchases	17.60	28	24 - 35	35,200
Wages & salaries	22.26	36	34 - 40	44,500
Equipment	5.60	9	5 - 13	11,200
Power	3.00	5	4 - 6	6,000
Other expenses	3.78	6	5 - 8	7,600
<u>Unaccounted for margin</u>	9.70	16	5 - 21	19,400

Manufacture of Pallets & Associated Products at a Sawmill

Most sawmill operators interviewed who had adequate records dried a portion of their lumber. As a rule all No. 1 Common and Better lumber was dried and for some species No. 2 Common was also dried. In general this accounted for 60 to 90 percent of the production. Concerns studied produced from 1 million to 6 million board feet annually. Their lumber-inventory-turnover rate varied from 3 to 10 times a year, depending largely upon their sales policies, and averaged 4.5 times a year. Often these plants operated concentration yards and did a business evenly divided between local and national markets. The average sales value of their lumber amounted to \$72.05 per thousand board feet, while among firms the average value ranged from \$70.00 to \$83.30 per thousand board feet (table 3).

An efficient-size operating unit for logging, saw-milling, and air-drying requires about 2 million board feet per year production. Records showed that the cost of equipment would amount to between \$40,000 and \$50,000 for an operation of this size, and that between \$20,000 and \$30,000 would be required for a lumber inventory depending upon sales policies and market conditions. In the woods and in the mill about 20 to 25 workers will be employed full time.

Concentration yards that also sawed and air-dried lumber are not included in this group. By buying selected lumber from other mills such yards increase their income to between \$85 and \$95 per thousand board feet. This lumber is sold primarily on the national market.

Table 3.--Producing green and air-dry lumber
(Receipts and expenditures)

	Value per		Value per	
	thousand board feet		2 million	
	Average	Range	board feet	
	<u>Dollars</u>	<u>Percent</u>	<u>Percent</u>	<u>Dollars</u>
<u>Receipts</u>				
Lumber sales	72.05	100		144,000
<u>Expenditures</u>				
Stumpage purchases	17.60	24	19 - 37	35,200
Wages & salaries	28.27	39	34 - 42	56,500
Equipment	8.30	12	8 - 14	16,600
Power	3.90	5	4 - 6	7,800
Other expenses	4.29	6	5 - 8	8,600
<u>Unaccounted for margin</u>	9.69	14	8 - 18	19,400

Manufacture of Green Lumber plus Air Drying

Some sawmills plagued with the problem of increasing gross returns from low-grade lumber, have found that the production of pallets, crating, heading, etc. are a partial solution. Annual production of mills specializing in pallet manufacture varied from 3/4 million to 4.8 million board feet. They dealt mostly in the national market and had a lumber turnover of 3 to 18 times a year. Lower turnover rates reflect the balanced production of a variety of products including air-dry, graded lumber. Higher turnover rates characterized those plants that made low-grade, disposable pallets of green lumber and sold some green lumber as well. Associated with this large difference in turnover rates is a wide range in production costs (table 4). The average value of their output amounted to \$104.30 and ranged from \$96 to \$120.

Let us look at our 2-million-board-feet-per-year plant production again and appraise the joint values produced by a sawmill which makes pallets or similar items. About \$75,000 will be required to install the plant and take care of woods equipment. This plant will employ between 30 to 50 workers. A widely varying investment in lumber inventory from a negligible amount to a high of about \$60,000 will be called for, depending upon sales and production possibilities. Many present operators began with a high turnover rate and small inventory and gradually diversified, lengthening their turnover period and incurring a high inventory cost.

Table 4.--Producing pallets and associated products
(Receipts and expenditures)

	Value per		Value per
	thousand board feet		2 million
	Average	Range	board feet
	<u>Dollars</u>	<u>Percent</u>	<u>Percent</u>
			<u>Dollars</u>
<u>Receipts</u>			
Lumber product sales	104.30	100	208,600
<u>Expenditures</u>			
Stumpage purchases	18.86	18	37,700
Wages & salaries	51.28	49	102,600
Equipment	10.20	10	20,400
Power	4.24	4	8,500
Other expenses	7.56	7	15,100
<u>Unaccounted for margin</u>	12.16	12	24,300

Manufacture of Air-Dried Surfaced Lumber for Sheathing & Crating

Operators of several planing mills were interviewed. These mills planed lumber and placed it on the national market for sheathing and crating material. They produced from 1 1/2 million board feet to 2 1/2 million board feet per year and usually specialized in No. 2 Common and Better pine and yellow-poplar lumber. These companies purchased lumber rather than stumpage and their operations were characterized by a lumber turnover 6 to 9 times a year. The average value of their output was \$81.51 per thousand board feet and the average value at any of the plants was confined to a narrow range of from \$80 to \$82 per thousand board feet (table 5).

Our plant to handle 2 million board feet will require an investment of \$25,000 to \$30,000 and an inventory value of about \$20,000 to \$30,000. Such a plant would buy rough, green lumber and employ 8 to 10 workers.

Table 5.--Producing sheathing
(Receipts and expenditures)

	Value per			Value per
	thousand board feet			2 million
	Average	Range		board feet
	Dollars	Percent	Percent	Dollars
<u>Receipts</u>				
Dressed lumber sales	81.51	100		163,000
<u>Expenditures</u>				
Green lumber purchases	57.40	70	66 - 75	114,800
Wages & salaries	12.03	15	13 - 18	24,100
Equipment	4.61	6	2 - 7	9,200
Power	1.36	2	1 - 2	2,700
Other expenses	2.15	2	2 - 6	4,300
<u>Unaccounted for margin</u>	3.96	5	3 - 11	7,900

Manufacture of Millwork

A number of operations were studied that depended on a production planer as a major piece of equipment. They differed from the previously described planer operations because they made products other than dressed lumber. Some of these mills operated in conjunction with sawmills while others contracted milling or bought rough lumber. Products associated with this type of business included paneling, molding, siding, trim, and fabricated and assembled products such as cabinets, windows, doors, and truckbeds. Seldom would one concern make all these items but most produced two or more in addition to dressed lumber. Production varied from 800,000 board feet to 2 million board feet per year. Turnover rates were low--1.5 to 2.5 times a year. The products went to national and local markets and ranged from \$114 to \$145 per thousand board feet in value with an average of \$128.21 (table 6).

The 2-million-board-feet-plant designed to make use of the green lumber product of small sawmills will require an investment of between \$50,000 and \$90,000 in plant and equipment. A relatively high inventory value can be expected ranging from \$75,000 to \$150,000. The plant will employ from 10 to 30 workers full time.

Table 6.--Producing millwork
(Receipts and expenditures)

	Value per		Value per	
	thousand board feet		2 million	
	Average	Range	board feet	
	<u>Dollars</u>	<u>Percent</u>	<u>Percent</u>	<u>Dollars</u>
<u>Receipts</u>				
Lumber product sales	128.21	100		256,400
<u>Expenditures</u>				
Green lumber purchases	60.37	47	43 - 49	120,700
Wages & salaries	29.18	23	14 - 29	58,400
Equipment	15.31	12	8 - 16	30,600
Power	3.52	3	2 - 5	7,000
Other expenses	4.74	3	1 - 6	9,500
<u>Unaccounted for margin</u>	15.09	12	9 - 14	30,200

Manufacture of Flooring

Several flooring plants that sold grade lumber and made molding as well as flooring, were contacted. These plants produced volumes ranging from 2 million board feet to 8 million board feet of products annually. The annual rate of lumber turnover ranged from 2 times to 5 times and these plants dealt mainly on the national market. The value of their products ranged from \$114 to \$145 per thousand board feet, averaging \$138.85 (table 7).

A plant producing only 2 million board feet per year is evidently on the smallish order. However, such a plant will require an investment of at least \$150,000 and needs to carry an inventory of lumber worth about \$70,000. Such an operation would employ 35 to 40 workers.

Table 7.--Producing flooring^{1/}
(Receipts and expenditures)

	Value per			Value per
	thousand board feet			2 million
	Average		Range	board feet
	<u>Dollars</u>	<u>Percent</u>	<u>Percent</u>	<u>Dollars</u>
<u>Receipts</u>				
Lumber product value	138.85	100		277,700
<u>Expenditures</u>				
Green lumber cost	64.94	47	40 - 54	129,900
Wages & salaries	38.29	28	22 - 32	76,600
Equipment	10.47	7	5 - 11	20,900
Power	2.23	2	1 - 2	4,500
Other expenses	7.50	5	3 - 10	15,000
<u>Unaccounted for margin</u>	15.42	11	6 - 15	30,800

^{1/} The values from these firms are adjusted to show the process beginning with green lumber.

Manufacture of Other Wood Products

Several different kinds of plants were observed that do even more processing. The sales value of their products is generally higher than those already discussed, sometimes as high as \$250 per thousand board feet.

Some examples include lumber companies that further processed high-grade lumber by kiln-drying or kiln-drying and planing, or by manufacturing dimension stock and highly precisioned parts for toys, furniture, and specialty uses. Some companies made and assembled parts for furniture, others completed particular furniture manufacturing processes.

The products that are discussed in detail here in no way complete the lists of possibilities nor do they carry lumber manufacture to its highest value. Additional manufacture, beyond the present article, will yield higher product values and more opportunity for community development.

A Word About Profit

Something needs to be said about profit. In the preceding development this vital element was hidden in "unaccounted for margin." There were three reasons for this: (1) We did not want to violate cooperator confidences; (2) no clearcut trends were noted due to type of business; (3) variations in tax and other costs among the individual concerns made profit quotations meaningless in a paper of this kind.

Profit seems to be a function of management rather than of type of business. The skilled manager who made the most of his local situation had high profits regardless of the business in which he engaged. Those who were less skilled often show a profit only because of low taxes and no insurance. Generally though it can be said that multiple-product companies had a higher profit than those who made a single product perhaps because their businesses were more stable throughout the year.

Other Key Considerations

Timing is very important in making plant expansion. Several concerns had expanded in 1955 by introducing new line to their existing operation. They stated that they would have gone out of business in 1957 had they adhered to their old practices and that they couldn't have met 1957 commitments for the expansion had they expanded in, say, late 1956 or 1957.

The greatest difficulty these successful operators voiced consistently was the dearth of "\$100-a-week" men. By this they imply that labor is no problem but good supervisors are hard to find.

Developing Timber Resource Potential for a Community

Let us cite a case that will illustrate the potential of the timber resource pointed out by the preceding tables.

Many communities, even whole counties, carry out the processing of forest products to the green lumber stage and no further. Much of this material could be processed by establishing an integrated planing mill (table 6). It will be remembered that such a plant makes dressed, air-dry lumber, siding, molding, and specialty products such as truckbeds. Let us use our 2-million-board-feet-per-year plant to show the effect of carrying the rough green lumber through this additional step (table 8).

By so doing, sales value can be doubled from the same amount of raw material. The increased processing is attended by a greater increase in the return to both labor and capital. In this particular case, doubling the sales value increased the return to both labor and capital $2\frac{1}{2}$ times.

Table 8.--Increased return by further processing: rough green lumber vs. air-dried, dressed lumber and associated products

(Plant capacity of 2 million board feet annually)

	Value		
	Production of rough green lumber	Further processing:	Increase
	Dollars	Dollars	Times
<u>Receipts</u>			
<u>Sales</u> ^{1/}	123,900	259,600	2.1
<u>Expenditures</u>			
Purchases (stumpage)	35,200	35,200	1.0
Payroll	44,500	102,900	2.3
Equipment	11,200	41,800	3.7
Power	6,000	13,000	2.2
Other	7,600	17,000	2.3
<u>Unaccounted for margin</u>	19,400	49,600	2.6

^{1/} Adjusted to conform to green-lumber-production sales value.

Importance of Markets

All the previous discussion is based on the assumption that markets exist for the products manufactured. Before any plant undertakes a conversion or expansion program, a careful survey should be made to make sure that adequate markets do exist or at least can be developed. Anything less would, of course, be poor business. But once assured that there is a demand for the products being considered, the far-sighted planner would do well to encourage carrying the manufacturing process further so that the local community could reap more of the economic benefits as outlined here.

The Central States Forest Experiment Station is headquartered at Columbus, Ohio and maintains major field offices at:

Ames, Iowa (in cooperation with Iowa State University)

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